

- 1 1. A method comprising:
2 forming a damascene via to a conductive line in
3 the periphery of a phase change memory.
- 1 2. The method of claim 1 including forming a phase
2 change memory including a phase change storage element and
3 a phase change threshold switch.
- 1 3. The method of claim 2 including forming said
2 switch over said element.
- 1 4. The method of claim 3 including forming a pore
2 over a substrate, said pore having a dimension smaller than
3 the feature size possible with available lithographic
4 techniques.
- 1 5. The method of claim 4 including forming said pore
2 by forming an aperture through an insulator and forming a
3 sidewall spacer in said aperture.
- 1 6. The method of claim 5 including forming the lower
2 electrode of said phase change storage element in said
3 pore.

1 7. The method of claim 2 including forming a barrier
2 layer between said threshold switch and said storage
3 element.

1 8. The method of claim 1 including forming an upper
2 electrode that has a vertical extent at least twice its
3 horizontal extent.

1 9. The method of claim 2 including forming an upper
2 electrode over said phase change storage element and said
3 threshold switch, said electrode having sidewall spacers.

1 10. The method of claim 9 including using said
2 sidewall spacers as a mask to etch through underlying
3 layers.

1 11. The method of claim 1 including forming a
2 plurality of cells as a plurality of integrated islands
3 spaced from one another.

1 12. The method of claim 11 including filling the
2 regions surrounding said islands with an insulator.

1 13. The method of claim 12 including forming said
2 insulator to a height over the upper extent of said upper
3 electrodes.

1 14. The method of claim 13 including forming grooves
2 through said insulator down to and past the upper extent of
3 said upper electrodes.

1 15. The method of claim 13 including forming a
2 vertical groove in a memory array and a periphery.

1 16. The method of claim 15 including filling said
2 groove in said periphery with a sacrificial light absorbing
3 material.

1 17. The method of claim 16 including etching said
2 groove in said periphery into said sacrificial light
3 absorbing material.

1 18. The method of claim 17 wherein forming a
2 damascene via includes filling said grooves with a
3 conductive material.

1 19. The method of claim 18 including forming said
2 groove in said periphery deeper than said grooves in the
3 memory array.

1 20. The method of claim 19 including forming said
2 grooves in said periphery to a depth below the upper extent
3 of said upper electrode and above the lower extent of said
4 upper electrode.

1 21. An apparatus comprising:
2 a phase change material;
3 a conductive line coupled to said phase change
4 material; and
5 a damascene via to said conductive line.

1 22. The memory of claim 21 wherein said memory
2 includes a phase change storage element and a phase change
3 threshold switch.

1 23. The memory of claim 22 wherein said switch is
2 formed over said element.

1 24. The memory of claim 23 including a substrate, a
2 pore over said substrate, said pore having a dimension
3 smaller than the feature size possible with available
4 lithographic techniques.

1 25. The memory of claim 24 including an insulator
2 over said substrate, said pore formed as an aperture in
3 said insulator, said pore having a sidewall spacer in said
4 aperture.

1 26. The memory of claim 25 including an electrode for
2 said phase change storage element in said pore.

1 27. The memory of claim 22 including a barrier layer
2 between said threshold switch and said storage element.

1 28. The memory of claim 21 including an upper
2 electrode having a vertical extent at least twice its
3 horizontal extent.

1 29. The memory of claim 21 wherein said damascene via
2 includes a metal line extending through an insulator.

1 30. A system comprising:
2 a controller;
3 a wireless interface coupled to said processor-
4 based device; and
5 a memory coupled to said device, said memory
6 including a phase change material, a conductive line
7 coupled to said phase change material, and a damascene via
8 to said conductive line.

1 31. The system of claim 30 wherein said memory
2 includes a phase change storage element and a phase change
3 threshold switch.

1 32. The system of claim 31 wherein said switch is
2 formed over said element.

1 33. The system of claim 32 including a substrate,
2 said pore over said substrate, said pore having a dimension
3 smaller than the feature size possible with available
4 lithographic techniques.

1 34. The system of claim 33 including an insulator
2 over said substrate, said pore formed as an aperture in
3 said insulator, said pore having a sidewall spacer in said
4 aperture.

1 35. The system of claim 34 including an electrode for
2 said phase change storage element in said pore.

1 36. The system of claim 30 wherein said wireless
2 interface includes a dipole antenna.